We Claim:

1. A semiconductor laser apparatus having a vertical emitter (2) and having at least one pump laser (5) for optically pumping the vertical emitter (2), with the vertical emitter (2) and the pump laser (5) being monolithically integrated,

wherein,

during operation, the pump laser (5) has a radiation-emitting zone (6) at a first temperature T1 and the vertical emitter has a radiation-emitting zone (3) at a second temperature T2, and the first temperature T1 is lower than the second temperature T2.

2. The semiconductor laser apparatus as claimed in claim 1,

wherein

the pump laser (5) and the vertical emitter (2) are epitaxially grown on a common substrate (15).

3. The semiconductor laser apparatus as claimed in claim 1,

wherein

the pump laser (5) and the vertical emitter (2) are mounted on a common mount (1), in particular a heat sink.

4. The semiconductor laser apparatus as claimed in claim 3,

wherein

the thermal resistance between the mount (1) and the radiation-emitting zone (6) of the pump laser is less than the thermal resistance between the mount (1) and the radiation-emitting zone (3) of the vertical emitter (2).

5. The semiconductor laser apparatus as claimed in claim 3, wherein the vertical emitter (2) and the pump laser (5) are arranged between the substrate (15) and the mount (1).

6. The semiconductor laser apparatus as claimed in claim 3, wherein one mirror layer or two or more mirror layers (4) is or are arranged between the radiation-emitting zone (3) of the vertical emitter (2) and the mount (1).

7. The semiconductor laser apparatus as claimed in claim 6, wherein the mirror layer or the mirror layers (4) is or are formed as a Bragg mirror.

8. The semiconductor laser apparatus as claimed in claim 1, wherein the pump laser (5) has an active layer (16) comprising its active zone (6), and the vertical emitter (2) has an active layer (13) comprising its active zone (3), with the active layer (16) of the pump laser (5) and the active layer (13) of the vertical emitter (2) having the same structure and/or the same composition.

9. The semiconductor laser apparatus as claimed in claim 1, wherein the active layer (16) of the pump laser (5) and/or the active layer (13) of the vertical emitter (2) are/is formed as a quantum well structure.

15. The semiconductor laser apparatus as claimed in claim 8, wherein the active layer (16) of the pump laser (5) and the active layer (13) of the vertical emitter (2) are formed jointly in one epitaxy step.

16. The semiconductor laser apparatus as claimed in claim 8, wherein the radiation-emitting zone (6) of the pump laser (5) produces pump radiation (9), which is injected into the radiation-producing zone (3) of the vertical emitter in a direction oblique or perpendicular to the main emission direction of the vertical emitter (2).

17. The semiconductor laser apparatus as claimed in claim 8, wherein the pump laser (5) is formed as an edge emitter.

18. The semiconductor laser apparatus as claimed in claim 1, wherein the vertical emitter (2) is formed as a vertically emitting laser, in particular formed as a VCSEL or a disk laser.